

# THE INTERNATIONAL JOURNAL OF BUSINESS & MANAGEMENT

## Influence of Seismic Survey Activities on the Environment in Soy North Ward, Elgeyo Marakwet County, Kenya

**Dorris Tallam**

M.A. Student, University of Nairobi, Kenya

**Dr. Joash Migosi**

Lecturer, Department of Open and Distant E-Learning Studies, University of Nairobi, Kenya

### **Abstract:**

*The intention of this study was to intently examine the influence of seismic survey activities on the Environment in Soy North ward, Elgeyo Marakwet County. The available research conducted does not focus on the influence of Oil Exploration projects on the Environment that this research intends to address. Descriptive research was the most appropriate research used simple random sampling for the community and purposive sampling for the experts. The data collected for the purpose of study were adopted and coded for completeness and accuracy. A self-administered questionnaire was used with closed ended questionnaire in obtaining information from the respondents at the community level. The study findings indicated that all the activities had influences on the environment. The study concluded that during the process of oil drilling several holes are left open on the surface. Large vegetation is cleared in oil exploration process and also the study concluded that access roads are constructed in the oil exploration areas so as access the seismic Lines and Well sites. The study recommended that Oil companies should be cautioned on indiscriminate mining on susceptible Environments and to do proper restorations after their operations. The companies should also take initiatives to capture and use more of the unwanted natural gas that comes out from the ground to carbon in the air without conveying so much as a single Watt of usable power.*

**Keywords:** Extractive activities, environment, oil exploration, Elgeyo Marakwet County, Kenya

### **1. Background**

Extractive activities refer to any process that encompasses the abstraction of unprocessed constituents from the earth that are valuable to the consumers. The process and operations entailing of all the activities involved from discovering a natural resource, drilling them and bringing them to the surface is what encompasses the extractive industry. Such process that are comprised in the expedition are; mining, dredging, quarrying and gas and oil exploration (UNEP,2009).The environment usually describes the surroundings. These surroundings can be biological or natural in nature. With the advanced focus on sustainable development, the term environment has been elaborated to capture the interaction of human beings with the natural resources in their surroundings (HOCADAO, 2012). According to Watts (2001) environment is social and natural conditions around current and future generations of humankind. It entails living and non-living matters in the surroundings. Among these surroundings is structures, human health, sites, Land and associated resources, nutrition and safety. In regard to the context herein above, environment can be regarded as man's natural habitation with various constituents within which a series of different levels comprising of processes and activities take place. In most cases these constituents and processes or activities reflect the level of growth within the environment that needs the protection and caring in all ramifications (Kisembo, 2009).

Some surface features are attributed to presence of hydrocarbons. They include escaping gas that cause underwater craters, oil seeps, pochmarks, and natural gas seeps. Exploration employs sophisticated methods and technology to establish presence and extent of hydrocarbons. Exploration geophysics is used where gravity survey is conducted in such areas shown to potentially have hydrocarbons (Lyatsky, 2010). Other procedures to detect clear features in regard to geology of the area are carried out. Further surveys are conducted on leads or what are termed as features of interest. It is after the prospect has been established which satisfies prospecting organization that an exploration well is dug (Omorodion, 2004).

Le Voi (2002) affirm that the ecology of the Niger Delta has massively impacted by hydro carbon activity. Marine life has been adversely impacted by oil spills negatively affecting livelihoods of fishing communities in the area. There has also been deforestation to create room for more wells in oil exploration. This has negatively affected rainfall affecting farming and herding communities in the area. As the rest of the people in Nigeria and the world enjoy the benefits of oil from the Niger Delta, some of the people in the area suffer from conflicts fueled by frustrations, poverty, and deprivation. This explains occasional disruptions of oil exploration operations where affected residents blame government and oil corporations of mistreatment in spite of the colossal oil fortune generated from the area (Arce, 2004). Tullow, a British oil exploration firm has worked in Ethiopia and Uganda. In Uganda, the firm commenced its operations in 2006. It has

magnificently opened the Lake Albert Rift Basin where approximately 1.7 billion barrels of oil were discovered (Gisladdottir & Stocking, 2015).

In the local Context, recently Kenya was divided into blocks and licenses issued by Kenyan Government to oil exploration companies. Tullow Oil discovered substantial oil resources in Lokichar Basin. The firm utilized its understanding of geology in neighboring Uganda to advance its operations in Kenya. Tullow's fruitful exploration efforts in Kenya have advanced its operations to North Lokichar Basin where it is estimated to have up to 4 billion barrels in oil resources. Drilling started at Ngamia-1 in 2012 which marked start of oil exploration in Kenya. This was the second onshore tertiary rift basin by Tullow in the East Africa region. Further exploration success by Tullow followed in Emekuya, Amosing, Erut, Twiga, Etom, Etuko, Ekunyuk, Ekales-1, Ewoi, and Agete (Lei, Ren, & Bian, 2016). In total, Tullow has drilled over 35 wells and conducted the necessary tests in North Lokichar basin. This has been instrumental in development and planning of the oil fields (Baum, & Ingram, 2002).

The British company also has done exploration and discovered traces of oil in Kenya's northern parts of the Rift valley in Kerio Valley, a discovery that could mean the possible opening of a second oil basin in Kenya as the East African country prepares to become an oil exporter for the first time (Okoth, 2012). From this observational view along with the several studies done by various scholars, the need to look at the influence of Extractive activities on the Environment was necessary to look into especially with concerns on the Oil Exploration Project in soy north ward, Elgeyo Marakwet County, Kenya.

### 1.1. Statement of the Problem

Oil is of great input in production activities in Kenya. However, it has made the Environment to be susceptible to its effects in the areas where it is explored. Negative Ecological impacts have become an eyesore not only close to the extractive sites, but far and even globally. Pollution, waste rocks, degradation of the soil, impact on buildings, plant yield, creation of unwanted roads, including movement of people and rising human activity, generate significant changes in the totality of the surrounding. At the moment, extraction is seen by those involved to be beneficial for them and at the mercy of both physical and human Environment even though the surroundings' harm is common in exploratory areas and not forgetting all the dangers linked up with the expedition process. Oil Exploration has taken place for over 5 years in Elgeyo Marakwet County. Exploration projects have been known to be disruptive to the Environment. With all the risks involved in this extractive activity, there is no research which has focused on these. It is in this context therefore that the study established the influence of extractive industries on the Environment in Elgeyo Marakwet County and with a focus on oil exploration projects.

### 1.2. Objective of the Study

To establish the influence of seismic Survey activities on the Environment in Soy North ward, Elgeyo Marakwet County.

## 2. Literature Review

### 2.1. Conceptual Framework

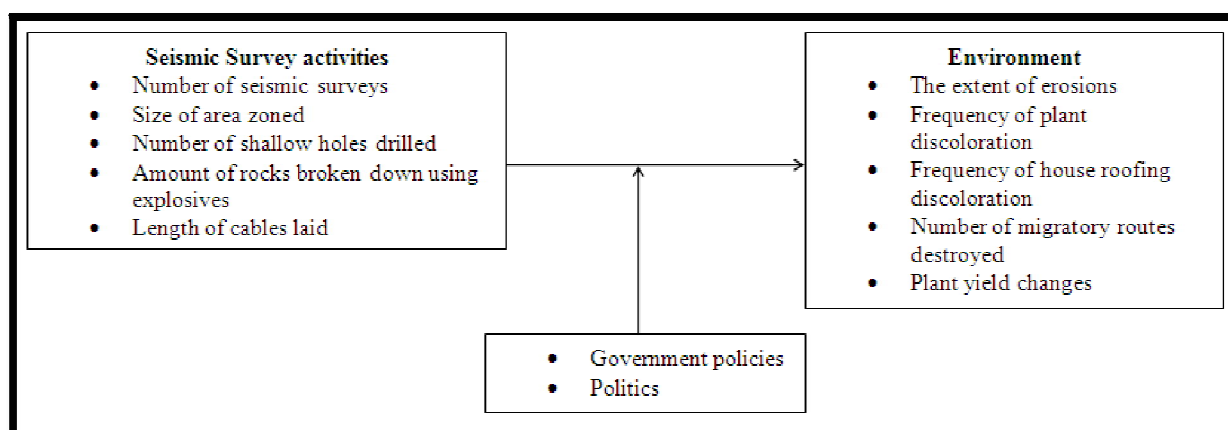


Figure 1: Conceptual Framework

## 3. Research Design

In this study, descriptive survey was used as the main research design. This design enables the researchers to gather, summarize, interpret and present the information that they have gathered as it uses exploratory and preliminary studies (Orodho, 2002).

### 3.1. Target Population

The research study was undertaken in soy north ward, majorly 3 locations. These are the areas where oil exploration has taken place for the last 5 years. Hence the target population for study was 384 residents, county officials and experts in the department of environment and civil society members. The target population comprised on key

informants who were residents in the area who had lived there for over 10 years and county officials and experts in the department of environment and civil society members.

### 3.2. Sample Size and Sampling Procedure

Fisher et al(1991) recommended formula for calculation:

$$nf = n/(1 + n/N)$$

Where;

nf= Sample Size

n= Sample size (when the population is more than 10000)

N=Estimate of the population

$$= \frac{384}{1 + 384/384}$$

The wanted Size was therefore comprised of 192 residents, county officials and experts in the department of environment and civil society members. Simple random Sampling technique was for the local residents and purposive sampling for the experts and county officials.

## 4. Research Findings and Discussion

### 4.1. Influence of Seismic Survey on the Environment

The research wanted to establish the influence of Seismic Survey on the Environment, in Elgeyo Marakwet County. The research findings are presented in the Table 1.

Statement		SA	A	U	D	SD	Total	Mean	SD
Several seismic surveys have been conducted in the area	F	75.40	71	10	18	22	190	3.77	0.325
	%	36.3	37.40	5.30	9.50	11.60	100.00	75.40	
A Vast area is zoned for seismic survey.	F	78.00	81	18	20	8	190	3.90	0.221
	%	33.20	42.60	9.50	10.50	4.20	100.00	78.00	
There are many shallow holes drilled in the surveyed area.	F	80.24	83	7	8	6	190	4.84.	0.514
	%	45.30	43.70	3.70	4.20	3.20	100.00	80.24	
Many rocks have been broken down using explosives	F	76.20	73	16	18	17	190	3.81	0.331
	%	34.70	38.40	8.40	9.50	8.90	100.00	76.20	
Long cables have been laid in the site	F	73.60	68	13	23	23	190	3.66	0.325
	%	33.20	35.80	6.80	12.10	12.10	100.00	73.60	

Table 1: Seismic Survey

Key: SA =Strongly Agree, A= Agree, U=Undecided, D= Disagree, SD=Strongly Disagree

The study findings on the influence of seismic Survey on the Environment indicated that 80.24 % (mean=4.84) of the respondents said that there are many shallow holes drilled in the area, 78.00 (mean=3.9) of the respondents said that a large area is zoned in the surveyed area, 75.40% (mean=3.77) of the respondents said that several seismic surveys have been conducted in this area, 76.20% (mean=3.81) of the respondents held that many rocks have been broken down using explosives and 73.60% (mean=3.66) of the respondents held that long cables have been laid in the area.

On interviewing county representatives and the civil societies, there was a general consensus that seismic surveys affect the environment as they involve activities that alter the natural state of the ground in which they are conducted. They noted that the challenge with seismic surveys is that once they are conducted the ground is left in a destroyed state with no proper rehabilitation especially when there is no oil found in the area. Little effort is made to rehabilitate the same piece of land and return it to its original state. For example one civil society member noted:

"every area where seismic surveys have been conducted the area never returns for use for agricultural purpose, it is left bare due to damages in the area"

This implies that during the process of oil drilling several holes are left open on the surface. Oil isn't sitting below the earth in vast liquid reserves like. Oil is embedded into rock, sand and mud. Therefore, there is need to start with seismic survey to understand the rock formation. After the aerial surveys are done, Shallow holes are drilled on the ground, later dynamites are put to send sound waves down the earth's surface. The dynamites may expand the holes when shot. This take a toll on the ecology and put many lives at risk. It is one of the destructive and hazardous method of oil exploration which leave open tunnels and shallow holes hence they are referred to as rat hole leading to pits.

The study finding is in agreement with Darmody, Bauer, Barkley, Clarke and Hamilton (2014) who affirmed that the small holes left after mining may cause long lived damage to the surrounding in many ways. One type of impact is destroying and disrupting the land surface. Rat hole activity, had environmental degradation in the region due to, biodiversity loss, waste land generation, pollution due to dust and noise (Eckert, Hüslér, Liniger &Hodel, 2015). There is immense pressure on local resources. Due to deforestation there is soil erosion. Loss of biodiversity in this region has led

to an alarming loss to different flora and fauna (El-Ghani, Amer 2016). Rat hole mining is referred so because the kinds of openings created by the activity which looks like holes created by rats (El-Ghani, Amer 2016).

#### 4.2. The Environment

The study sought to determine the finding on the dependent variable. These findings are presented in Table 2.

Statement		SA	A	U	D	SD	Total	Mean	SD
Oil exploration has increased soil erosion in the area.	F	53	65	17	32	23	190	3.49	0.541
	%	27.90	34.20	8.90	16.80	12.10	100.00	69.80	
There is high rate of plant discoloration	F	57	65	22	23	23	190	3.58	0.145
	%	30.00	34.20	11.60	12.10	12.10	100.00	71.60	
The roofs of houses within the area have been discoloring at a high rate	F	57	63	16	35	19	190	3.55	0.321
	%	30.00	33.20	8.40	18.40	10.00	100.00	71.00	
Wild life migratory routes have been destroyed in the area.	F	56	57	14	34	29	190	3.41	
	%	29.50	30.00	7.40	17.90	15.30	100.00	68.20	
There are drastic changes in plant yield in the area	F	79	81	11	11	8	190	4.12	0.221
	%	41.60	42.60	5.80	5.80	4.20	100.00	82.40	

Table 2: Analysis of Dependent Variable (Environment)

Key: SA =Strongly Agree, A= Agree, U=Undecided, D= Disagree, SD=Strongly Disagree

The study findings on environment indicated that 82.40% (mean=4.12) of the respondents held that there is drastic changes in plant yield in the area, 71.60% (mean=3.58) of the respondents held that There is high rate of plant discoloration, 71.00% (mean=3.55) of the respondents held that the roofs of houses within the area have been discoloring at a high rate and 69.80% (mean=3.49) of the respondents held that Drilling has increased soil erosion in the area and 68.20% (mean=3.41) of the respondents held that Wild life migratory routes have been destroyed in the area. This implies that plants yield is the most affected by mining in the environment.

Interview responses especially from the civil society mainly were consensual that the greatest effect of these oil exploration activities was their effect on the health of the people. They noted that previous studies have been able to show that these activities affect plants that people eat and also the effect on the air which people breathe. As a result, there have been an increasing number of health complications in these areas over time. County government official number two confirmed this when he noted that:

"There is a clear environmental problem when oil exploration is undertaken in specific areas and hence the county is in the process of reviewing the oil explorations laws."

## 5. Conclusion

The study concluded that during the process of oil drilling several holes are left open on the surface. Large vegetation is cleared in oil exploration process and also the study concluded that access roads are constructed in the oil exploration areas so as access the seismic Lines and Well sites. The study findings further indicated that an increase of seismic survey increases environmental influence.

## 6. Recommendations

- Extractive Companies should be cautioned on indiscriminate exploration even on vulnerable grounds which result to too much open shallow holes in exploration areas.
- Oil exploration companies should take steps to capture and use more of the unwanted natural gas that goes from the ground to carbon in the air without delivering so much as a single Watt of usable power.

### 6.1. Recommendations for Further Studies

Further study could be done on the effect of project management techniques on exploration drilling in Kenya's Arid and Semi-Arid Land areas

## 7. References

- Arce, O. (2004). Participatory design, challenges and experiences using design in development. New York: McGraw-Hill.
- Barkley, D., Clarke, S., & Hamilton, D. (2014). Agricultural impacts of longwall mine subsidence: the experience in Illinois, USA and Queensland, Australia. *Int J Coal Sci Technology* 1:207-212.
- Baum, J. A., & Ingram, P. (2002). Interorganizational learning and network organization: Toward a behavioral theory of the interfirm. *The economics of choice, change, and organization: Essays in memory of Richard M. Cyert*, 191-218.

- iv. Darmody, R. G., Bauer, R., Barkley, D., Clarke, S., & Hamilton, D. (2014). Agricultural impacts of longwall mine subsidence: the experience in Illinois, USA and Queensland, Australia. *International Journal of Coal Science & Technology*, 1(2), 207-212.
- v. Eckert, S., Hüsler, F., Liniger, H., & Hodel, E. (2015). Trend analysis of MODIS NDVI time series for detecting land degradation and regeneration in Mongolia. *Journal of Arid Environments*, 113, 16-28.
- vi. El-Ghani, M. M. A., & Amer, W. M. (2003). Soil-vegetation relationships in a coastal desert plain of southern Sinai, Egypt. *Journal of Arid Environments*, 55(4), 607-628.
- vii. Fisher A.A., Laing J. E., Stoeckel J.E and Townsend J.W (1991). *Handbook for Family Planning Operations Research Design* 2nd ed. p43. Population Council. New York, USA.
- viii. Gisladdottir, G., & Stocking, M. (2005). Land degradation control and its global environmental benefits. *Land degradation & development*, 16(2), 99-112.
- ix. Okoth J. (2012). Kenya: A fair share of oil revenue for the Turkana, *Pambazuka News*, 587.
- x. Omorodion, F. I. (2004). The impact of petroleum refinery on the economic livelihoods of women in the Niger Delta region of Nigeria. *JENDA: A Journal of Culture and African Women Studies*, 6, 1-15.
- xi. Lei, S., Ren, L., & Bian, Z. (2016). Time-space characterization of vegetation in a semiarid mining area using empirical orthogonal function decomposition of MODIS NDVI time series. *Environmental earth sciences*, 75(6), 1-11.
- xii. HOCADÉO. (2012). Report on the baseline study on the current trends of oil exploration and Socio-economic: implications of the emerging oil and gas industry on the livelihood security of the local communities in the Albertine region. Kampala: Newvision.
- xiii. Kitembo, T. B. (2009). Oil exploration and land conflicts in Hoima District: a case study of Buseruka Sub-County (1998-2008) (Doctoral dissertation, Makerere University).
- xiv. Le Voi, M. (2002). Responsibilities, rights and ethics. *Doing Postgraduate Research*. London: SAGE Publications, 153-163.
- xv. Lyatsky, H. V. (2010). Magnetic and Gravity Methods in Mineral Exploration: The Value of Well-Rounded Geophysical Skills. *CSEG RECORDER*, 2010, 30-35.
- xvi. UNEP. (2009). Sustainable livelihoods approach: progress and possibilities for change. London: Department for International Development.
- xvii. Watts, M. (2001). *Curse of the Black Gold: 50 years of Oil in the Niger Delta*. Brooklyn: Powerhouse Books.